ECOLOGICAL IMPACT ASSESSMENT

REHABILITATION OF THE N2 SECTION 18 FROM TETYANA (KM24.00) TO SITEBE KOMKULU (KM41.00)

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REVISIONS TRACKING TABLE

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INTRODUCTION

1.1 Project description

The South African National Roads Agency (SANRAL) is proposing the upgrade of Section 18 of the N2 National Route from Tetyana (KM24.00) to Sitebe Komkulu (KM41.00) in the Eastern Cape Province. The proposed development will consist of the construction of various safety improvements on the N2. These improvements include:

- Reconstruction of the existing road, including widening and realignment both within and outside the current road reserve where necessary.
- Installation of new road drainage.
- New major drainage structures (bridges/major culverts).
- Safety improvements to intersections where necessary.
- Construction of temporary deviations

In addition to the EIA process, a water use licence application (WULA) will be submitted in accordance to the National Water Act (No. 36 of 1998) regulated by the Department of Water Affairs (DWA) for new major drainage structures.

A mining right application will also be submitted for two quarry sites in accordance with the regulations pertaining to the Minerals and Petroleum Resources Development Act (No. 28 of 2002) and regulated by the Department of Mineral Resources (DMR).

GIBB Engineering and Science (GIBB), the project managers, contracted EOH Coastal & Environmental Services (EOH) as the Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment.

1.2 Project locality

The proposed N2 road upgrade section will take place between Tetyana within the Mbhashe Local Municipality (Amathole District Municipality) and Sitebe Komkulu in the King Sabata Dalindyebo Local Municipality (OR Tambo District Municipality) (Figure 1.1).

The 2 proposed new quarry sites are located at:

- Quarry 1: 31° 53.191’S; 28° 32.832’E
- Quarry 2: 31° 57.516’S; 28° 20.438’E
1.3 Alternatives

Five alternative road deviations are proposed for the N2 road upgrade section (Table 1.1). In this Assessment all five deviations are called Alternative 1 while the original N2 road layout is considered as Alternative 2.

The No-Go option refers to the proposed development not taking place and therefore none of the identified issues (positive or negative) will impact on the natural environment.
Table 1.1. Deviations proposed (in red) for the N2 road upgrade section.

<table>
<thead>
<tr>
<th>Deviation #</th>
<th>Layout</th>
<th>Location: (GPS Coordinates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><img src="image1.png" alt="Image" /></td>
<td>31° 55.717°S 28° 26.231°E (@KM27.4)</td>
</tr>
<tr>
<td>2</td>
<td><img src="image2.png" alt="Image" /></td>
<td>31° 54.994°S 28° 27.460°E (@KM29.6)</td>
</tr>
<tr>
<td>3</td>
<td><img src="image3.png" alt="Image" /></td>
<td>31° 54.503°S 28° 27.839°E (@KM31.9)</td>
</tr>
</tbody>
</table>
1.4 Objectives

The objectives of the current ecological assessment were to:

- Provide a general description of the natural vegetation of the specific area to be developed and adjacent areas that will be impacted.
- Provide a general description of the indigenous fauna of the area, using a habitat approach and based on the natural vegetation of the site.
- Identify plant and animal species of special concern and suitable species for rehabilitation.
- Identify sensitive ecological environments and provide an assessment of potential impacts and mitigation recommendations.

1.5 Terms of Reference

The following terms of reference were used as a guideline for the objectives of this study:

- Provide a detailed description of the ecological (fauna and flora) environment within the area and immediately surrounding the footprint of the proposed road and will consider terrestrial fauna and flora. Fauna include mammals, reptiles, amphibians, birds and insects. This aspect of the report will specifically include the identification of –
  - Areas of high biodiversity;
• The presence of species of special concern, including sensitive, endemic and protected species;
• Habitat associations and conservation status of the identified fauna and flora;
• The presence of areas sensitive to invasion by alien species; and
• The presence of conservation areas and sensitive habitats where disturbance should be avoided or minimised.
  − Review relevant legislation, policies, guidelines and standards.
  − An assessment of the potential direct and indirect impacts resulting from the proposed road upgrade and associated infrastructure, both on the footprint and the immediate surrounding area during construction and operation;
  − A detailed description of appropriate mitigation measures that can be adopted to reduce negative impacts for each phase of the project, where required; and
  − Checklists of faunal groups identified in the region to date, highlighting sensitive species and their possible areas of distribution.

1.6 Approach

The study site and surrounding areas were assessed using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current vegetation classifications and biodiversity programmes and plans. This included the consideration of:

  − Vegetation Map of South Africa, Lesotho and Swaziland
  − Eastern Cape Biodiversity Conservation Plan (ECBCP)
  − South African National Biodiversity Institute (SANBI) wetlands database

Further to the above, a site visit was conducted on 8 April 2014 in order to assess the actual ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities. The site visits also served to inform potential impacts of the proposed project and how it would significantly impact on the surrounding ecological environment.

1.7 Limitations and assumptions

This report is based on currently available information and, as a result, the following limitations and assumptions are implicit:

  − Descriptions of the natural and social environments are based on limited fieldwork and available literature.
  − Species of special concern are difficult to find and difficult to identify due to seasonal variations, thus species described in this report do not comprise an exhaustive list. It is likely that additional species of special concern will be found during construction and operation of the development.
  − The ecology of the site was assessed on a sample basis.
2 RELEVANT LEGISLATION

The following legislation is relevant when considering ecological impacts identified during the Planning and Design, Construction and Operation Phase of the Rehabilitation of the N2 Section 18 from Tetyana to Sitebe Komkulu.

Table 2.1. Environmental legislation considered in the preparation of the Ecological Report for the Rehabilitation of the N2 Section 18 from Tetyana to Sitebe Komkulu.

<table>
<thead>
<tr>
<th>Title of Environmental legislation, policy or guideline</th>
<th>Implications for Rehabilitation of the N2 Section 18 from Tetyana to Sitebe Komkulu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constitution Act (No. 108 of 1996)</td>
<td>Obligation to ensure that the proposed development will not result in pollution and ecological degradation; and Obligation to ensure that the proposed development is ecologically sustainable, while demonstrating economic and social development.</td>
</tr>
<tr>
<td>National Environmental Management Act (NEMA) (No. 107 of 1998)</td>
<td>The developer must apply the NEMA principles (Section 2), the fair decision-making and conflict management procedures (Sections 17 to 22) that are provided for in NEMA. The developer must apply the principles of Integrated Environmental Management and consider, investigate and assess the potential impact of existing and planned activities on the environment, socio-economic conditions and the cultural heritage.</td>
</tr>
<tr>
<td>National Environment Management: Biodiversity Act (No. 10 of 2004)</td>
<td>The proposed development must conserve endangered ecosystems and protect and promote biodiversity; Must assess the impacts of the proposed development on endangered ecosystems; No protected species may be removed or damaged without a permit; The proposed site must be cleared of alien vegetation using appropriate means.</td>
</tr>
<tr>
<td>National Water Act (No. 36 of 1998)</td>
<td>This Act provides details of measures intended to ensure the comprehensive protection of all water resources, including the water reserve and water quality. This proposed development will likely trigger the need for a water-use license according to Sections 21 (c) and (i) of the Act.</td>
</tr>
<tr>
<td>Minerals and Petroleum Resources Development Act (No. 93 of 1996)</td>
<td>The project will make use of mineral resources for the upgrade of the road.</td>
</tr>
<tr>
<td>National Road Traffic Act (No. 93 of 1996)</td>
<td>Increased traffic will be experienced during the construction phase.</td>
</tr>
</tbody>
</table>

The following policies are relevant to the project:

Municipal Policy
- OR Tambo District Municipality Integrated Development Plan (IDP) and Spatial Development Framework (SDF) (2011)
- OR Tambo District Municipality Environmental Management Plan (2012)
- King Sabata Dalindyebo Local Municipality IDP (2012-2017)
- Mbhashe Local Municipality IDP (2012-2017) and EMP

Provincial Policy
- Eastern Cape Biodiversity Conservation Plan (2007)
3 ASSESSMENT METHODOLOGY

The aim of this assessment is to identify areas of ecological importance and to evaluate these in terms of their conservation importance. In order to do so, the ecological sensitivity of areas is assessed as well as an identification of potential plant Species of Special Concern (SSC) that may occur in habitats present in the area.

To a large extent, the condition and sensitivity of the vegetation will also determine the presence of animal SSC and areas with high faunal biodiversity. It is for this reason that the assessment focuses on the vegetation aspects of the site, and includes only a small section on the fauna recorded from, and expected to live on the site.

It is not the aim of this study to produce a complete list of all animal and plant species occurring in the region, but rather to examine a representative sample. It is however, important to note that areas of high sensitivity as well as SSC have been identified as far as possible, either from records from the site or a review of their habitat requirements, and whether or not these habitats occur within the site. The aim of this study is to identify areas of high sensitivity and those that may be subject to significant impacts from the project. Aspects that would increase impact significance include:

- Presence of plant SSC.
- Presence of animal SSC.
- Vegetation types (which also constitute faunal habitats) of conservation concern.
- Areas of high biodiversity.
- The presence of process areas:
  - Ecological corridors
  - Wetlands (and rivers)
  - Complex topographical features (especially steep and rocky slopes that provide niche habitats for both plants and animals).

3.1 Species of special concern

3.1.1 Plant species of special concern

Data on the known distribution and conservation status for each potential plant SSC has to be obtained in order to develop a list of SSC. These plant species are those that may be impacted significantly by the proposed activity. In general these will be species that are already known to be threatened or at risk. Efforts to provide the conservation status (‘red list’ status) of individual species may provide additional valuable information on Species of Concern (see http://www.iucnredlist.org/). Species that are afforded special protection, which are protected by CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna) are also regarded as SSC (see http://www.cites.org/).

3.1.2 Animal species of special concern

Faunal SSC in terms of the project area are defined as:

Threatened species:

1. Animal species listed in the Endangered or Vulnerable categories in the revised South African Red Data Books (SA RDB – amphibians, du Preez and Carruthers, 2009; reptiles, Branch 1988; birds, SA Birding, 2008; terrestrial mammals, Apps, 2000); and/or
2. Species included in other international lists (e.g., 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Animals).
3.1.3 Definitions

The following definitions of the conservation status of plant and animal SSC are provided (Source: SANBI Red Data List):

- **Critically Endangered (CR)** - A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.

- **Endangered (EN)** - A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.

- **Vulnerable (VU)** - A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

- **Near Threatened (NT)** - A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

- **Sensitive species** - Species not falling in the categories above but listed in:
  - Appendix 1 or 2 of the Convention of International Trade in Endangered Species (CITES).

- **Endemic species** - Species endemic to South Africa, and more specifically Eastern Cape.

- **Least concern (LC)** – A taxon is of Least Concern when it does not qualify for any of the other categories. Widespread and abundant taxa are typically listed in this category.

3.1.4 Sampling protocol

Vegetation

A sampling protocol was developed to evaluate the vegetation of the study area and to add detailed information on the plant communities present. The protocol took into account the amount of time available for the study, the accessibility of different parts of the area, and limitations such as the seasonality of the vegetation.

A stratified random sampling approach was adopted, whereby initial assumptions were made about the diversity of vegetation, based on initial reconnaissance visits, previous studies or from aerial photographs and satellite imagery and the area stratified into these basic types. In this way the time available was used much more efficiently than in random sampling, but there is a risk of bias and the eventual results may simply ‘prove’ the assumptions. Sample sites within selected areas were chosen at random to ensure adequate coverage of vegetation types or recognised zones within the blocks of the different vegetation types.

In general, the stratification of the site was influenced by obvious features of the vegetation, such as the presence of conspicuous species or vegetation structure. These factors may be largely independent of the floristic make-up of the vegetation, and by definition the biological communities present. Sample plots were analysed by determining the dominant species in each plot, as well as any alien invasive species and potential species of special concern occurring within the plots.

Vegetation communities were then described according to the dominant species recorded from each type, and these mapped and assigned a sensitivity score.

Animals

The assessment of animals was based on a general observation of species noted onsite during the site assessment, but with particular consideration of known potential animal SSC.
3.2 Vegetation mapping

Vegetation was mapped from aerial photographs, satellite images and literature descriptions (e.g. SANBI and ECBCP) and related to data gathered on the ground.

3.3 Sensitivity assessment

This section of the report explains the approach to determining the ecological sensitivity of the study area on a broad scale. The approach identifies zones of high, moderate and low sensitivity according to a system developed by CES and used in numerous ecological studies. It must be noted that the sensitivity zonings in this study are based solely on ecological characteristics and social and economic factors have not been taken into consideration. The sensitivity analysis described here is based on 10 criteria which are considered to be of importance in determining ecosystem and landscape sensitivity. The method predominantly involves identifying sensitive vegetation or habitat types, topography and land transformation (Table 3.1).

Although very simple, this method of analysis provides a good, yet conservative and precautionary assessment of the ecological sensitivity.

Table 3.1. Criteria used for the analysis of the sensitivity of the area.

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>LOW SENSITIVITY</th>
<th>MODERATE SENSITIVITY</th>
<th>HIGH SENSITIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Topography</td>
<td>Level or even</td>
<td>Undulating; fairly steep slopes</td>
<td>Complex and uneven with steep slopes</td>
</tr>
<tr>
<td>2 Vegetation - Extent or habitat type in the region</td>
<td>Extensive</td>
<td>Restricted to a particular region / zone</td>
<td>Restricted to a specific locality / site</td>
</tr>
<tr>
<td>3 Conservation status of fauna / flora or habitats</td>
<td>Well conserved independent of conservation value</td>
<td>Not well conserved, moderate conservation value</td>
<td>Not conserved - has a high conservation value</td>
</tr>
<tr>
<td>4 Species of special concern</td>
<td>None, although occasional regional endemics</td>
<td>No endangered or vulnerable species, some indeterminate or rare endemics</td>
<td>One or more endangered and vulnerable species, or more than 2 endemics or rare species</td>
</tr>
<tr>
<td>5 Habitat fragmentation leading to loss of viable populations</td>
<td>Extensive areas of preferred habitat present elsewhere not susceptible to fragmentation</td>
<td>Reasonably extensive areas of preferred habitat elsewhere and habitat susceptible to fragmentation</td>
<td>Limited areas of this habitat, susceptible to fragmentation</td>
</tr>
<tr>
<td>6 Biodiversity contribution</td>
<td>Low diversity or species richness</td>
<td>Moderately diverse, and moderately high species richness</td>
<td>High species diversity, complex plant and animal communities</td>
</tr>
<tr>
<td>7 Visibility of the site or landscape from other vantage points</td>
<td>Site is hidden or barely visible from any vantage points with the exception in some cases from the sea</td>
<td>Site is visible from some or a few vantage points but is not obtrusive or very conspicuous</td>
<td>Site is visible from many or all angles or vantage points</td>
</tr>
<tr>
<td>8 Erosion potential or instability of the region</td>
<td>Very stable and an area not subjected to erosion</td>
<td>Some possibility of erosion or change due to episodic events</td>
<td>Large possibility of erosion, change to the site or destruction due to climatic or other factors</td>
</tr>
<tr>
<td>9 Rehabilitation potential of the area or region</td>
<td>Site is easily rehabilitated</td>
<td>There is some degree of difficulty in rehabilitation of the site</td>
<td>Site is difficult to rehabilitate due to the terrain, type of habitat or species required to reintroduce</td>
</tr>
<tr>
<td>10 Disturbance due</td>
<td>Site is very</td>
<td>There is some degree of</td>
<td>The site is hardly or very</td>
</tr>
</tbody>
</table>
A sensitivity map was drawn up with the aid of a satellite image so that the sensitive regions and vegetation types could be plotted (see Chapter 6).

3.4 Impact assessment

3.4.1 Impact rating methodology

To ensure a direct comparison between various specialist studies, a standard rating scale has been defined and will be used to assess and quantify the identified impacts. This is necessary since impacts have a number of parameters that need to be assessed. Five factors need to be considered when assessing the significance of impacts, namely:

- Relationship of the impact to temporal scales - the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.

- Relationship of the impact to spatial scales - the spatial scale defines the physical extent of the impact.

- The severity of the impact - the severity/beneficial scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party.

- The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious the impact is when nothing is done about it. The word 'mitigation' means not just 'compensation', but also the ideas of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.

- The likelihood of the impact occurring - the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.

- Each criterion is ranked with scores assigned as presented in Table 3-2 to determine the overall significance of an activity. The criterion is then considered in two categories, viz. effect of the activity and the likelihood of the impact. The total scores recorded for the effect and likelihood are then read off the matrix presented in Table 3-3, to determine the overall significance of the impact. The overall significance is either negative or positive.

- The significance scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of a social nature need to reflect the values of the affected society.
Cumulative Impacts

Cumulative impacts affect the significance ranking of an impact because the impact is taken in consideration of both onsite and offsite sources. For example, pollution making its way into a river from a development may be within acceptable national standards. Activities in the surrounding area may also create pollution which does not exceed these standards. However, if both onsite and offsite activities take place simultaneously, the total pollution level may exceed the standards. For this reason it is important to consider impacts in terms of their cumulative nature.

Seasonality

Although seasonality is not considered in the ranking of the significance, it may influence the evaluation during various times of the year. As seasonality will only influence certain impacts, it will only be considered for these, with management measures being imposed accordingly (i.e. dust suppression measures being implemented during the dry season).

Table 3.2. Significance Rating Table.

<table>
<thead>
<tr>
<th>Temporal Scale</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Short term</td>
<td>Less than 5 years (many construction phase impacts are of a short duration).</td>
</tr>
<tr>
<td>Medium term</td>
<td>Between 5 and 20 years.</td>
</tr>
<tr>
<td>Long term</td>
<td>Between 20 and 40 years (from a human perspective almost permanent).</td>
</tr>
<tr>
<td>Permanent</td>
<td>Over 40 years or resulting in a permanent and lasting change that will always be there.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spatial Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
</tr>
<tr>
<td>Localised</td>
</tr>
<tr>
<td>Project Level</td>
</tr>
<tr>
<td>Surrounding Areas</td>
</tr>
<tr>
<td>Municipal</td>
</tr>
<tr>
<td>Regional</td>
</tr>
<tr>
<td>National</td>
</tr>
<tr>
<td>International/Global</td>
</tr>
<tr>
<td>Will definitely occur</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degree of Confidence or Certainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definite</td>
</tr>
<tr>
<td>Probable</td>
</tr>
<tr>
<td>Possible</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>Unsure</td>
</tr>
</tbody>
</table>

**Table 3.3. Impact Severity Rating.**

<table>
<thead>
<tr>
<th>Overall Significance</th>
<th>VERY HIGH NEGATIVE</th>
<th>VERY BENEFICIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>These impacts would be considered by society as constituting a major and usually permanent change to the (natural and/or social) environment, and usually result in severe or very severe effects, or beneficial or very beneficial effects.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> The loss of a species would be viewed by informed society as being of VERY HIGH significance.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Example:</strong> The establishment of a large amount of infrastructure in a rural area, which previously had very few services, would be regarded by the affected parties as resulting in benefits with VERY HIGH significance.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HIGH NEGATIVE</th>
<th>BENEFICIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>These impacts will usually result in long term effects on the social and/or natural environment. Impacts rated as HIGH will need to be considered by society as constituting an important and usually long term change to the (natural and/or social) environment. Society would probably view these impacts in a serious light.</td>
<td></td>
</tr>
<tr>
<td><strong>Example:</strong> The loss of a diverse vegetation type, which is fairly common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated.</td>
<td></td>
</tr>
<tr>
<td><strong>Example:</strong> The change to soil conditions will impact the natural system, and the impact on affected parties (such as people growing crops in the soil) would be HIGH.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODERATE NEGATIVE</th>
<th>SOME BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>These impacts will usually result in medium to long term effects on the social and/or natural environment. Impacts rated as MODERATE will need to be considered by society as constituting a fairly important and usually medium term change to the (natural and/or social) environment. These impacts are real but not substantial.</td>
<td></td>
</tr>
<tr>
<td><strong>Example:</strong> The loss of a sparse, open vegetation type of low diversity may be regarded as MODERATELY significant.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LOW NEGATIVE</th>
<th>FEW BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as LOW will need to be considered by the public and/or the specialist as constituting a fairly unimportant and usually short term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect.</td>
<td></td>
</tr>
<tr>
<td><strong>Example:</strong> The temporary changes in the water table of a wetland habitat, as these systems are adapted to fluctuating water levels.</td>
<td></td>
</tr>
<tr>
<td><strong>Example:</strong> The increased earning potential of people employed as a result of a development would only result in benefits of LOW significance to people who live some distance away.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NO SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are no primary or secondary effects at all that are important to scientists or the public.</td>
</tr>
<tr>
<td><strong>Example:</strong> A change to the geology of a particular formation may be regarded as severe from a geological perspective, but is of NO significance in the overall context.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DON'T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>In certain cases it may not be possible to determine the significance of an impact. For example, the primary or secondary impacts on the social or natural environment given the available information.</td>
</tr>
<tr>
<td><strong>Example:</strong> The effect of a particular development on people’s psychological perspective of the environment.</td>
</tr>
</tbody>
</table>
4 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

The study site and surrounding areas were described using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current vegetation classifications and biodiversity programmes and plans. This was followed by a site visit in order to assess the actual ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities.

4.1 Desktop investigation

Published literature on the ecology of the area was referenced in order to describe the study site in the context of the region and the Eastern Cape Province. The following documents/plans are referenced:

- SANBI vegetation (Mucina & Rutherford, 2005)
- SANBI Working for Wetlands
- ECBCP
- Review of the SANBI Red Data List, CITES, PNCO, NEMBA, DAFF

4.1.1 SANBI Vegetation (Mucina and Rutherford, 2006)

The vegetation types affected by the proposed new N2 road upgrade includes (Figure 4.1):

- Eastern Cape Thornveld,
- Eastern Valley Bushveld,
- Mthatha Moist Grassland.

Figure 4.1. SANBI Vegetation map.
Figure 4.2 shows that all deviations will take place in Eastern Valley Bushveld.

Both quarry sites will be located on Eastern Valley Bushveld. A small section of Quarry 1 will be located on endangered Mthatha Most Grassland, while a small section of Quarry 2 will be located on Bisho Thornveld (Figure 4.3).

Eastern Valley Bushveld is characterised by semi-deciduous savannah woodlands in a mosaic with thickets, often succulent and dominated by species of *Euphorbia* and *Aloe*. Eastern Valley Bushveld is classified as “Least Threatened” by Mucina and Rutherford (2006).
Bhisho Thornveld is found on undulating to moderately steep slopes, sometimes in shallow, incised valleys. Open savannah characterised by small tress of *Acacia natalia*, with short to medium, dense sour grassy understory, usually dominated by *Themeda triandra* when in good condition. This vegetation type is considered as "Least Threatened" by Mucina and Rutherford (2006).

Mthatha Moist Grassland is characterised by undulating plains and hills supporting species-poor, sour, wiry grassland with *Eragrostis plana* and *Sporobolus africanus*, although in good condition, it is more likely to be dominated by *Themeda triandra*. This vegetation type is considered "Endangered" by SANBI. Only a small section of N2 road will be situated within this vegetation type.

### 4.1.2 Eastern Cape Biodiversity Conservation Plan (ECBCP)

ECBCP is a first attempt at detailed, low-level conservation mapping for land-use planning purposes. The aim of ECBCP is to map critical biodiversity areas through a systematic conservation planning process. The current biodiversity plan includes the mapping of priority aquatic features, land-use pressures, critical biodiversity areas and develops guidelines for land and resource-use planning and decision-making.

The main outputs of the ECBCP are "critical biodiversity areas" or CBAs, which are allocated the following management categories:

1. CBA 1 = Maintain in a natural state
2. CBA 2 = Maintain in a near-natural state
3. CBA 3 = Functional Landscapes
4. CBA 4 = Towns & Settlements
5. CBA 4 = Woodlots & Plantations
6. CBA 4 = Cultivated Land

ECBCP maps the CBAs based on extensive biological data and input from key stakeholders. Although ECBCP is mapped at a finer scale than the National Spatial Biodiversity Assessment (Driver *et al.*, 2005) it is still, for the large part, inaccurate and "course". Therefore it is imperative that the status of the environment, for any proposed development MUST first be verified before the management recommendations associated with the ECBCP are considered (Berliner and Desmet, 2007). It is also important to note that in absence of any other biodiversity plan, the ECBCP has been adopted by the Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) as a strategic biodiversity plan for the Eastern Cape.

The majority of the road upgrade will occur in areas identified by ECBCP as degraded Functional Landscape (CBA 3) areas which are coloured as grey in Figure 4.4. The remainder of the road upgrade route falls within CBA 2 (maintain in a near-natural state) and CBA 4 (towns and settlements as well as cultivated land).
The land-use management recommendation for CBA 2 is to maintain biodiversity in near natural state with minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted.

For CBA 3, the land-use management recommendation involves managing the environment for sustainable development, keeping natural habitat intact in wetlands (including wetland buffers) and riparian zones.

The land-use management recommendation for CBA 4 involves managing the environment for sustainable development.

All road deviation sections will occur in CBA3 (Functional Landscapes) (Figure 4.5).

Both quarry sites will be located on Functional landscapes (Figure 4.6).
4.1.3 **SANBI Wetlands and Rivers**

Figure 4.7 indicate the position of the 19 identified perennial and non-perennial river crossings that will be impacted by the proposed new N2 road upgrade. As the existing structure of all these crossings will only be upgraded, these crossings will require General Authorisations (GA’s) only from the Department of Water and Sanitation (DWS).
The 2 perennial rivers identified along the N2 road upgrade section are the Mbashe River and the Candu River (which is a tributary of the Mbashe River) (Crossings 1 for the Candu River & crossing 4 for the Mbashe River in Figure 4.7).

Figure 4.8 shows a close-up view of the preferred alternative road deviations and the associated river and stream crossings. These crossings will also require GA’s from DWS.

No wetlands will be impacted by the proposed new N2 road section. No wetland was found within 500m of the N2 road section.

Figure 4.7. Location of the 19 river crossings along the proposed new N2 road section.
Figure 4.8. Close-up of all the road deviations in relation to crossings.

Figure 4.9 below shows that both mining sites will be located 32m or more from an existing water body.

Figure 4.9. Map showing all rivers & streams in the vicinity of the mining sites.
4.1.4 Current land-use and general state of environment

The majority of the N2 road upgrade will be situated within an existing road reserve. The surrounding land-uses in these sections (Figure 4.10) include large sections of degraded and unimproved grassland interspersed with smaller areas of suburban development (formal villages) and degraded bushland/scrubland.

Figure 4.10. Map showing land use along the proposed new N2 road upgrade section.

The preferred alternative road upgrade sections (Figure 4.11) shows that 4 sections are located in degraded and unimproved grassland while 1 section occurs in thicket/bushland/scrubland.

Figure 4.12 below shows that quarry 1 will be located on degraded and unimproved grassland while quarry 2 will be located mostly on unimproved grassland.
An elevation profile of the N2 road section shows that elevation decreases from 729 meters above sea level (masl) around Tetyana to 454 masl midway and then increase again to 787 masl (Figure 4.13). The topography can therefore be considered a gently undulating terrain.
4.1.6 Climate

This area normally receives about 556mm of rain per year, with most rainfall occurring during summer. The rainfall for the region ranges from 100 to 200mm of cumulative rainfall for the summer months and 400 to 500mm for the winter months (AGIS Database). The region is humid subtropical with the warmest month being below 22°C.

4.1.7 Geology and soils

The study area falls within the Main Karoo Basin which signifies a large scale basin that was infilled with up to 12 km of sedimentary strata and capped by a 1.4 km thick unit of basaltic lava. Today the remnants of the lava layer are called the Drakensberg Mountain.

More locally, the rocks consist of a sandstone-rich layer called the Katberg Formation, although there are some mudstones present, increasing slightly towards the north. Intra-formational mud-pellet conglomerates are common with red coloured mudstone units and predominant arenaceous sandstones (Fig 4.14). These are sedimentary rocks, which are the product of the deposition of the breakdown of rocks and minerals built up in layers. Intruding through all the sediment layers are dolerite dykes and sills of various sizes.

Quarry 1 will be located on the Katberg Fm of rocks, while quarry 2 will be located on the Karoo dolerite.
The main soil type identified is soils with minimal development (Figure 4.15). These are very shallow soils overlying either rock, diverse hard soils or unconsolidated materials. These soils usually have a high potential for erosion, especially when combined with moderate to steep slopes.

A small section of N2 Road around the Mbashe River is found on soils with a marked clay accumulation. These soils are considered as recent sedimentation arising as fluvisols from sediments carried in the river.

Both mining sites will be located on shallow soils with minimal development.
Figure 4.15. Soil types of the surrounding area for the proposed N2 upgrade from Tetyana to Sitebe Komkulu.
5 SITE INVESTIGATION

A site investigation were conducted on the 8th April 2014 in order to confirm the desktop findings, to assess the actual ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities. The site visit also served to inform potential impacts of the proposed project and how significantly it would impact on the surrounding ecological environment. Vegetation was assessed along a 50m buffer on either side of the N2 road.

5.1 Vegetation description

The photo sequence below illustrates sections of the proposed Rehabilitation of the N2 from Tetyana to Sitebe Komkulu.

Plate 5.1. Large sections are covered by secondary grassland interspersed with lone standing wattle and gum trees situated on flat to low undulating slopes.
Plate 5.2. A large stand of aloes (*Aloe ferox*) was identified on the western side of the Mbashe River.
Plate 5.3. A second large stand of aloes (*Aloe ferox*) was identified further along the N2 going eastwards.
Plate 5.3. The area surrounding the Aloe patch is considered as pristine to semi-pristine Eastern Valley Bushveld.

Large sections along the N2 road upgrade section are covered by secondary grassland interspersed with lone standing wattle and gum trees situated on flat to low undulating slopes. These areas are considered as low sensitivity due to the absence of SSC, the transformed nature of the area and the high amount of developed areas found within this section.

A 2 km long section of N2 road immediately before the Mbashe River (on the eastern side) is located within a large Aloe ferox vegetation patch. This patch of Aloes phases into pristine to semi-pristine Eastern Valley Bushveld before reaching the Mbashe River. A second Aloe patch was identified next to the N2 going eastwards. Aloe ferox is a CITES protected species and considered an important pioneer plant.

5.2 Water bodies

EOH will be applying for GA’s from DWS for the affected bridge/large culvert upgrades. Figure 4.5 in the previous chapter indicates the positions of all the perennial and non-perennial river crossings found along the linear development that will require GA’s.

Table 5.1 below shows details of each of the identified water crossings along the N2 road upgrade route.
Table 5.1. Details of each affected water crossing.

<table>
<thead>
<tr>
<th>Water crossing 1: Candu River</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GPS Co-ordinates:</strong> 31°55'58.12&quot;S; 28°25'57.79&quot;E</td>
</tr>
<tr>
<td><strong>Distance from start:</strong> 5.48km</td>
</tr>
</tbody>
</table>

**Aerial view:**

![Google Earth aerial view of Candu River crossing]

**Upstream view:**

![Upstream view of Candu River crossing]

**Downstream view:**

![Downstream view of Candu River crossing]
Water crossing 2: Candu Tributary

GPS Co-ordinates: 31°55'46.17"S; 28°26'1.18"E
Distance from start: 5.85km

Aerial view:

Upstream view:  

Downstream view:
Water crossing 3: Candu Tributary 2

GPS Co-ordinates: 31°55’39.51”S; 28°26’20.22”E

Distance from start: 6.4km

Aerial view:

Upstream view:  

Downstream view:
Water crossing 4: Mbashe River

GPS Co-ordinates: 31°55'11.41"S; 28°26'53.92"E
Distance from start: 7.8km

Aerial view:

Upstream view:

Downstream view:
Water crossing 5: Mbashe Tributary

GPS Co-ordinates: 31°54'59.01"S; 28°27'7.89"E
Distance from start: 8.3km

Aerial view:

Upstream view:  
Downstream view:
Water crossing 6: Mbashe Tributary 2

GPS Co-ordinates: 31°54'58.57"S; 28°27'21.43"E

Distance from start: 8.7km

Aerial view:

Upstream view: 

Downstream view:
Water crossing 7: Mbashe Tributary 3

GPS Co-ordinates: 31°54'53.04"S; 28°27'54.29"E
Distance from start: 9.6km

Aerial view:

Upstream view:  
Downstream view:
### Water crossing 8: Mbashe Tributary 4

**GPS Co-ordinates:** 31°54'33.94"S; 28°27'50.75"E  
**Distance from start:** 10.5km

**Aerial view:**

[Image of aerial view]

**Upstream view:**

[Image of upstream view]

**Downstream view:**

[Image of downstream view]
<table>
<thead>
<tr>
<th>Water crossing 9: Mbashe Tributary 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS Co-ordinates: 31°54’25.49”S; 28°27’51.40”E</td>
</tr>
<tr>
<td>Distance from start: 10.6km</td>
</tr>
</tbody>
</table>

Aerial view:

Upstream view:

Downstream view:
Water crossing 10: Kwelerana Tributary

GPS Co-ordinates: 31°54'5.13"S; 28°28'5.69"E
Distance from start: 11.3km

Aerial view:

Upstream view:  

Downstream view:
### Water crossing 11: Kwelerana Tributary 2

**GPS Co-ordinates:** 31°53′45.86″S; 28°28′9.25″E  
**Distance from start:** 11.9km

**Aerial view:**

![Aerial view](image)

**Upstream view:**

![Upstream view](image)

**Downstream view:**

![Downstream view](image)
Water crossing 12: Mtentu Tributary

GPS Co-ordinates: 31°52'10.34"S; 28°30'17.89"E
Distance from start: 16.8km

Aerial view:

Upstream view:

Downstream view:
<table>
<thead>
<tr>
<th><strong>Water crossing 13: Mtentu Tributary 2</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GPS Co-ordinates:</strong> 31°52′8.73″S; 28°30′19.29″E</td>
</tr>
<tr>
<td><strong>Distance from start:</strong> 16.87 km</td>
</tr>
<tr>
<td><strong>Aerial photo:</strong></td>
</tr>
</tbody>
</table>

![Aerial photo](image-url)  
**Upstream view:** ![Upstream view](image-url)  
**Downstream view:** ![Downstream view](image-url)
Water crossing 14: Mtentu Tributary 3

GPS Co-ordinates: 31°52'3.02"S; 28°30'31.56"E

Distance from start: 17.3km

Aerial view:

Upstream view:  

Downstream view:
Water crossing 15: Mtentu Tributary 4

GPS Co-ordinates: 31°51’53.91”S; 28°30’51.43”E
Distance from start: 17.8km

Aerial view:

Upstream view:

Downstream view:
## Water crossing 16: Mtentu Tributary 5

**GPS Co-ordinates:** 31°51'50.41"S; 28°30'51.93"E  
**Distance from start:** 18km

**Aerial photo:**

**Upstream view:**

**Downstream view:**
Water crossing 17: Mtentu Tributary 6

GPS Co-ordinates: 31°51'33.62"S; 28°30'54.52"E
Distance from start: 18.5km

Aerial view:

Upstream view:

Downstream view:
Water crossing 18: Mtentu Tributary 7

GPS Co-ordinates: 31°51'13.77"S; 28°30'58.42"E
Distance from start: 19.2km

Aerial view:

Upstream view:

Downstream view:
5.3 Mining sites

Both sites are existing mining sites that will be expanded. Quarry site 1 is located close to the town of Nywara and consists entirely of grassland. No SSC were identified.

Quarry site 2 is bordered by cultivated land towards the east & SE. The site contains remnants of scrubland on low ridges interspersed with secondary grassland on the plains. Various aloes (Aloe ferox) occurs on these ridgelines. A single large cabbage tree (Cussonia spicata) was also observed. A section in the middle of the site show signs of heavy surface erosion.

Below is an aerial image of each mining site followed by photos taken during the site visit.
Table 5.2. Photos of the mining sites.

**Quarry site 1: 31° 53.191'S; 28° 32.832'E**

Showing the existing excavations that took place onsite:

The site consists entirely of secondary grassland with patches of bare soil and rock:
Level areas consists of grassland while sloped ridges contains short shrubs:

A section in the middle is heavily eroded:
A single cabbage tree was observed on a ridge line: Dense patches of *Aloe ferox* occurs on most of the ridgelines:

A small section of the site has already been excavated:

5.4 Plant species identified

The list of species observed along the proposed route for the upgrade of the N2 road section between Tetyana and Sitebe Komkulu is presented in Table 5.3 below. The species plant list below is not a comprehensive list and certain seasonally flowering species may have gone undetected.

Table 5.3. List of all plant species identified onsite with their conservation status.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Common name</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Aristida congesta</em></td>
<td>Aristida</td>
<td>Poaceae</td>
</tr>
<tr>
<td><em>Cynodon dactylon</em></td>
<td>Couch grass</td>
<td>Poaceae</td>
</tr>
<tr>
<td><em>Eragrostis curvula</em></td>
<td>Weeping love grass</td>
<td>Poaceae</td>
</tr>
<tr>
<td><em>Panicum deustum</em></td>
<td>Buffalo grass</td>
<td>Poaceae</td>
</tr>
<tr>
<td><em>Paspalum dilatatum</em></td>
<td>Dallis grass</td>
<td>Poaceae</td>
</tr>
<tr>
<td><em>Sporobulus africanus</em></td>
<td>Parramatta grass</td>
<td>Poaceae</td>
</tr>
<tr>
<td><em>Themeda triandra</em></td>
<td>Red grass</td>
<td>Poaceae</td>
</tr>
</tbody>
</table>

**Trees**

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Common name</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acacia natalitia</em></td>
<td>Natal/coastal sweet thorn</td>
<td>Fabaceae</td>
</tr>
<tr>
<td><em>Cussonia spicata</em></td>
<td>Cabbage tree</td>
<td>Araliaceae</td>
</tr>
<tr>
<td><em>Dombeya rotundifolia</em></td>
<td>Wild pear</td>
<td>Pentapetaceae</td>
</tr>
<tr>
<td><em>Ehretia rigida</em></td>
<td>Coral tree</td>
<td>Boraginaceae</td>
</tr>
</tbody>
</table>

**Succulents**

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Common name</th>
</tr>
</thead>
</table>
| *Aloe ferox*                | Bitter aloe            | Liliaceae
Below is a list of all alien invasive pant species identified along the N2 road upgrade section. These plants are classified according to the Conservation of Agricultural Resources Act (Act No. 43 of 1983 or CARA).

Table 5.4. List of all alien invasive plant species identified.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Common name</th>
<th>CARA classification status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia mearnsii</td>
<td>Black wattle</td>
<td>Invader (Category 2)</td>
</tr>
<tr>
<td>Cirsium vulgare</td>
<td>Scotch thistle</td>
<td>Weed (Category 1)</td>
</tr>
<tr>
<td>Eucalyptus spp.</td>
<td>Gum tree</td>
<td>Invader (Category 2)</td>
</tr>
<tr>
<td>Opuntia ficus-indica</td>
<td>Prickly pear</td>
<td>Weed (Category 1)</td>
</tr>
<tr>
<td>Senna didymobotrya</td>
<td>Peanut butter cassia</td>
<td>Invader (Category 3)</td>
</tr>
</tbody>
</table>

5.4.1 **Plant SSC**

Potential SSC include all those plants listed in terms of the IUCN, CITES and both national and provincial legislation that may occur in the area of study. The list of SSC includes over 133 species which are listed individually by Victor and Dold (2003), the IUCN red data list, the South African National Biodiversity Institute (SANBI), the Forests Act and the Provincial Nature Conservation Ordinance (PNCO) 16 of 1974 for the Eastern Cape. In addition, the PNCO lists eight plant families and six plant genera that are afforded blanket protection throughout the province. The following plant species appearing on this list was identified onsite.

Table 5.5. List of all SSC identified onsite.

<table>
<thead>
<tr>
<th>SSC Name</th>
<th>Conservation status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aloe ferox</td>
<td>CITES Appendix II</td>
</tr>
<tr>
<td>Pelargonium spp.</td>
<td>Least concerned (SANBI Red Data List)</td>
</tr>
</tbody>
</table>

5.5 **Animal species**

No amphibians, reptiles, terrestrial invertebrates, birds and nesting areas as well as large mammals were observed onsite. Small mammals such as rodents, ground squirrels, bats and a variety of insects, amphibians and reptiles are expected to occur on site. There might be some protected animal species associated with river areas.

5.6 **Discussion**

The two dominant vegetation types present onsite (namely Bisho Thornveld and Eastern Valley Bushveld) are both classified by SANBI as LEAST THREATENED. Both these vegetation types are transformed to secondary grassland by human activities and only small remnants remains around rivers and deep valleys.

A small section around Tetyana in the beginning of the N2 road upgrade section consists of Mthatha Moist Grassland which is classified as “ENDANGERED” by SANBI, but most of the affected vegetation is highly impacted by human activities and not considered as ‘pristine’. No CBA 1 or 2 classified areas (as per ECBCP) will be impacted by the proposed N2 road upgrade section.
Various streams and rivers transect, or are located within 500m of the N2 road upgrade section between Tetyana and Sitebe Komkulu. All water bodies (wetlands, rivers, streams and drainage systems) are considered as highly sensitive and require mitigation to minimise construction and operation impacts on them. As per the National Water Act (No 36 of 1998) and managed by the DWA, any affected water body impacted by the proposed road upgrade, or within 50m of a water body, or within 500m of a wetland will require GA’s from the DWA.

Various steep slopes were identified along the proposed N2 road upgrade section. As soils in the area is highly susceptible to erosion (mudrock & sandstones are considered as ‘soft’ rock that weathers easily), storm water management plays a huge role in the road upgrade design. Some sections will require significant storm water design to avoid any long term erosional issues arising in the future.

Although no animal SSC were observed onsite, there is still a possibility of some SSC being present especially around the Mbashe and Candu Rivers.

The surrounding environment consists largely of individual villages interspersed with small crop field plots utilised mainly for subsistence farming.

5.7 Issues identified

The following issues were identified during the site assessment of the proposed upgrade of the N2 road section between Tetyana and Sitebe Komkulu.

Table 5.6. Issues identified during the site assessment of the proposed Rehabilitation of the N2 from Tetyana to Sitebe Komkulu.

<table>
<thead>
<tr>
<th>ISSUES IDENTIFIED</th>
<th>DESCRIPTION OF IMPACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of plant SSC</td>
<td>Upgrade of the N2 road section will result in the permanent loss of various plant SSC identified.</td>
</tr>
<tr>
<td>Loss of animal SSC</td>
<td>Upgrade of the N2 road section may result in the permanent loss of unidentified animal SSC, especially around the Mbashe and Candu Rivers</td>
</tr>
<tr>
<td>Loss of a high volume of <em>Aloe ferox</em> species</td>
<td>High volumes of <em>Aloe ferox</em> species are found on either side of the Mbashe River as well as on the quarry 2 site. Upgrade of the N2 road section and mining of quarry 2 will result in the permanent loss of these species.</td>
</tr>
<tr>
<td>Damage of the Candu &amp; Mbashe riverine system</td>
<td>Upgrading the sections of N2 road as well as the bridges across these rivers may cause increase levels of sedimentation and pollution into them during both construction and operation.</td>
</tr>
<tr>
<td>Loss of indigenous vegetation</td>
<td>Although both Bisho Thornveld and Eastern Cape Bushveld are not considered as endangered vegetation types, the high levels of transformation of these vegetation types in the area causes limitation on development within pristine and semi-pristine areas.</td>
</tr>
<tr>
<td>Loss of endangered Mthatha Moist Grassland</td>
<td>Unnecessary damage and disturbance to natural vegetation (Mthatha Moist Grassland) due to poor planning.</td>
</tr>
<tr>
<td>Soil erosion and sedimentation</td>
<td>Inappropriate road stormwater design may lead to an increase in surface soil erosion and subsequently sedimentation of the surrounding rivers and streams.</td>
</tr>
<tr>
<td>Invasion of alien plant species</td>
<td>The removal of existing natural vegetation creates ‘open’ habitats that will favours the establishment of undesirable species in the area that are typically very difficult to eradicate and may pose a threat to neighbouring ecosystems.</td>
</tr>
</tbody>
</table>
6 SENSITIVITY ASSESSMENT

A site assessment was conducted in order to confirm desktop information and infer accurate descriptions of the current ecological integrity of the site at a more detailed level. A further objective was to assist in impact identification and assessment. This section discusses potential sensitive ecosystems.

6.1 Sensitive environments

A sensitivity map was developed by identifying areas of high, moderate and low areas of sensitivity (Figure 6.1).

Areas of high sensitivity include process areas such as rivers, wetlands and streams that are important for ecosystem functioning including surface and ground water dispersal. A 32m buffer around all water bodies was included.

Moderate sensitivity is given to areas that, despite being somewhat degraded, still provide a valuable contribution to biodiversity and ecosystem functioning as they are pristine or semi-pristine and have a relatively high species richness, these areas may also contain species of special concern. Moderate sensitivity is further given to steeply sloped areas.

Low sensitivity is given to areas that are highly impacted by current land use and thus highly degraded and provide no value to the ecosystem and are highly unlikely to harbour any SSC.

Figure 6.1. Sensitivity map for the proposed N2 road upgrade section between Tetyana and Sitebe Komkulu.
6.2 Recommendations

Various mitigations are recommended (based on the level of sensitivity of the affected area) to reduce the impacts of the proposed N2 road upgrade section between Tetyana and Sitebe Komkulu on the surrounding natural environment.

6.2.1 High sensitivity areas

All water bodies are considered as “high sensitive”, (coloured red in Figure 6.1) and as such are considered as “No-Go Areas”. No further loss of natural areas and no further impacts must be allowed in these areas. If unavoidable, authorisation must be obtained from the DWS for any construction taking place inside or within 50 meters of any river or stream and within 500m of a wetland.

6.2.2 Moderate sensitivity areas

These areas include pristine (undisturbed) and semi-pristine (low level of disturbance) areas as well as areas with high quantities of SSC. Depending on constraints (such as concentrations of protected species, or infrastructure limitations), these areas can withstand a limited loss of, or disturbance to, natural areas.

6.2.3 Low sensitivity area

These areas are considered as severely disturbed or transformed by human activities, including cultivation, urban development and rural settlements, as well as degraded areas. These areas are suitable for development and will only require low level mitigations.

6.2.4 Mining sites

Both mining sites are considered as low sensitivity areas. Various SSC were identified on low ridgelines within quarry site 2 and will require mitigation.

6.3 Issues identified

The following issues were identified during the sensitivity assessment of the proposed upgrade of the N2 road section between Tetyana and Sitebe Komkulu.

Table 6.1. Issues identified during the sensitivity assessment of the proposed upgrade of the N2 from Tetyana to Sitebe Komkulu.

<table>
<thead>
<tr>
<th>ISSUES IDENTIFIED</th>
<th>DESCRIPTION OF IMPACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disturbance of sensitive areas</td>
<td>Erosion and degradation of water-courses and associated habitats due to poor planning and design (i.e. inappropriate utilisation of sensitive aquatic systems).</td>
</tr>
<tr>
<td>Loss of endangered and protected vegetation</td>
<td>Upgrade of the N2 road section will result in the permanent loss of various plant SSC identified.</td>
</tr>
<tr>
<td></td>
<td>Unnecessary damage and disturbance to sensitive Mthatha Moist Grassland due to poor planning.</td>
</tr>
<tr>
<td>Poor rehabilitation of moderate and high sensitive areas</td>
<td>Poor rehabilitation of sensitive vegetation may lead to the permanent loss of these ecosystems as well as allow invading alien vegetation species to expand.</td>
</tr>
<tr>
<td>Loss of a high volume of Aloe ferox species</td>
<td>High volumes of Aloe ferox species are found on the quarry 2 site. Mining of quarry 2 will result in the permanent loss of these species.</td>
</tr>
</tbody>
</table>
### 7 IMPACT IDENTIFICATION AND ASSESSMENT

#### 7.1 Identified Impacts

Ecological impacts were identified during the Planning and Design, Construction and Operational Phases of the proposed Rehabilitation of the N2 from Tetyana to Sitebe Komkulu are described below. These included the consideration of direct, indirect and cumulative impacts that may occur.

Table 7.1. Impact identified during the phases of the Rehabilitation of the N2 from Tetyana to Sitebe Komkulu for all alternatives.

<table>
<thead>
<tr>
<th>Phases</th>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Description of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning &amp; Design</td>
<td>Loss of indigenous vegetation</td>
<td>Direct</td>
<td>Although both Bisho Thornveld and Eastern Cape Bushveld are not considered as endangered vegetation types, the high levels of transformation of these vegetation types in the area causes limitation on development within pristine and semi-pristine areas.</td>
</tr>
<tr>
<td></td>
<td>Soil erosion and sedimentation</td>
<td>Direct</td>
<td>Inappropriate road stormwater design may lead to an increase in surface soil erosion and subsequently sedimentation of the surrounding rivers and streams.</td>
</tr>
<tr>
<td></td>
<td>Disturbance of sensitive areas</td>
<td>Direct</td>
<td>Erosion and degradation of water-courses and associated habitats due to poor planning and design (i.e. inappropriate utilisation of sensitive aquatic systems).</td>
</tr>
<tr>
<td></td>
<td>Loss of endangered and protected vegetation</td>
<td>Direct</td>
<td>Upgrade of the N2 road section will result in the permanent loss of various plant SSC identified.</td>
</tr>
<tr>
<td>Construction</td>
<td>Damage of the Candu &amp; Mbashe riverine system</td>
<td>Direct, indirect, cumulative</td>
<td>Upgrading the sections of N2 road as well as the bridges across these rivers may cause increase levels of sedimentation and pollution into them during both construction and operation.</td>
</tr>
<tr>
<td></td>
<td>Loss of animal SSC</td>
<td>Direct, indirect, cumulative</td>
<td>Upgrade of the N2 road section may result in the permanent loss of unidentified animal SSC, especially around the Mbashe and Candu Rivers</td>
</tr>
<tr>
<td></td>
<td>Poor rehabilitation of moderate and high sensitive areas</td>
<td>Direct, indirect, cumulative</td>
<td>Poor rehabilitation of sensitive vegetation may lead to the permanent loss of these ecosystems as well as allow invading alien vegetation species to expand.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Direct, indirect, cumulative</td>
<td>The removal of existing natural vegetation creates ‘open’ habitats that will favours the establishment of undesirable species in the area that are typically very difficult to eradicate and may pose a threat to neighbouring ecosystems.</td>
</tr>
<tr>
<td></td>
<td>Loss of endangered and protected vegetation</td>
<td>Direct</td>
<td>Disturbance of sensitive Mthatha Moist Grassland due to construction activities.</td>
</tr>
<tr>
<td></td>
<td>Invasion of alien species</td>
<td>Direct, indirect</td>
<td>Allowing invading species to expand will lead to a large scale alien invasion.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7.2 Impact Assessment

The impacts identified in Section 7.1 are assessed in terms of the criteria described in Section 3.4 and are summarised in the tables below (Table 7.2 – 7.4).

<table>
<thead>
<tr>
<th>Phases</th>
<th>Issue</th>
<th>Nature of Impact</th>
<th>Description of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Toxicants spilling from vehicles</td>
<td>Direct, indirect and cumulative</td>
<td>Toxicants (such as heavy metals, hydrocarbons, surfactants and oils) spilled from vehicles may negatively impact the surrounding environment and biodiversity.</td>
</tr>
</tbody>
</table>
Table 7.2. Assessment and mitigation of impacts in the Planning and Design Phase for all alternatives.

<table>
<thead>
<tr>
<th>DESCRIPTION OF IMPACTS</th>
<th>SPATIAL SCALE</th>
<th>TEMPORAL SCALE (DURATION)</th>
<th>CERTAINTY SCALE/ LIKELIHOOD</th>
<th>SEVERITY/ BENEFICIAL SCALE</th>
<th>SIGNIFICANCE PRE-MITIGATION</th>
<th>MITIGATION MEASURES</th>
<th>SIGNIFICANCE POST-MITIGATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Issue: Loss of indigenous vegetation</strong></td>
<td>Localised</td>
<td>Short-term</td>
<td>Definite</td>
<td>Moderately severe</td>
<td>MODERATE</td>
<td>• An Environmental Control Officer (ECO) must be appointed to oversee construction activities • Construction activities must be limited in areas where pristine and semi-pristine Bisho Thornveld and Eastern Cape Bushveld are found.</td>
<td>LOW</td>
</tr>
<tr>
<td><strong>Issue: Soil erosion and sedimentation</strong></td>
<td>Localised</td>
<td>Long-term</td>
<td>Probable</td>
<td>Severe</td>
<td>HIGH</td>
<td>• Ensure that appropriate stormwater structures are designed and implemented. • Ensure that all road sections situated on slopes incorporate storm water diversion • Ensure that all stormwater structures are designed in line with both SANRAL and DWS requirements. • If any construction takes place inside or within 50 meters of any river, stream or drainage system, authorisation from DWS must be obtained. • If any construction takes place inside or within 500 meters of any wetland, authorisation from DWS must be obtained.</td>
<td>MODERATE</td>
</tr>
</tbody>
</table>
### Issue: Disturbance of sensitive areas

Erosion and degradation of water-courses and associated habitats due to poor planning and design (i.e. inappropriate utilisation of sensitive aquatic systems).

<table>
<thead>
<tr>
<th>Study area</th>
<th>Long-term</th>
<th>Possible</th>
<th>Moderately severe</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Develop and implement an Erosion Action Plan.

- Ensure that a buffer zone of 32 metres from all perennial and non-perennial rivers and streams are maintained. No development activities may occur within this area.
- If any construction takes place inside or within 32 meters of any water body, authorisation from DWA must be obtained.

### Issue: Loss of endangered and protected vegetation

Upgrade of the N2 road section will result in the permanent loss of various plant SSC identified.

<table>
<thead>
<tr>
<th>Localised</th>
<th>Permanent</th>
<th>Definite</th>
<th>Severe</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The road upgrade route must be surveyed prior to topsoil removal in order to locate SSC and transplant them into the neighbouring undeveloped environment.
- A Plant Rescue & Protection Plan must be implemented and managed by a vegetation specialist familiar with the site in consultation with the appointed ECO.
### Table 7.3. Assessment and mitigation of impacts identified in the Construction Phase for all alternatives.

<table>
<thead>
<tr>
<th>DESCRIPTION OF IMPACTS</th>
<th>SPATIAL SCALE</th>
<th>TEMPORAL SCALE (DURATION)</th>
<th>CERTAINTY SCALE (LIKELIHOOD)</th>
<th>SEVERITY/ BENEFICIAL SCALE</th>
<th>SIGNIFICANCE PRE-MITIGATION</th>
<th>MITIGATION MEASURES</th>
<th>SIGNIFICANCE POST-MITIGATION</th>
</tr>
</thead>
</table>
| Issue: Damage of the Candu & Mbashe riverine system | Study area | Long-term | Possible | Moderately severe | HIGH | • Ensure that a buffer zone of 32 metres from both the Candu & Mbashe Rivers is maintained. No development activities may occur within this area.  
• If any construction footprint takes place inside or within 32 meters of both the Candu & Mbashe Rivers, authorisation from DWS must be obtained. | LOW |
| Issue: Loss of animal SSC | Localised | Permanent | Possible | Moderately Severe | MODERATE | • The development area must be surveyed prior to topsoil removal in order to locate and capture any SSC and relocate them. | LOW |
| Issue: Poor rehabilitation of moderate and high sensitive areas | Project level | Long-term | Probable | Moderately severe | MODERATE | • A Rehabilitation Management Plan must be implemented.  
• An Alien Removal Plan must be implemented and run during the construction phase. | LOW |
| Poor rehabilitation of sensitive vegetation may lead to the permanent loss of these ecosystems as well as allow invading alien vegetation species to expand | Project level | Long-term | Probable | Moderately severe | MODERATE | • An Alien Removal Plan must be implemented and run during the construction phase. | LOW |
| The removal of existing natural vegetation creates 'open' habitats that will favour the establishment of undesirable species in the area that are typically very difficult to eradicate | Project level | Long-term | Probable | Moderately severe | MODERATE | • An Alien Removal Plan must be implemented and run during the construction phase. | LOW |
and may pose a threat to neighbouring ecosystems.

**Issue: Loss of endangered and protected vegetation**

<table>
<thead>
<tr>
<th>DESCRIPTION OF IMPACTS</th>
<th>SPATIAL SCALE</th>
<th>TEMPORAL SCALE (DURATION)</th>
<th>CERTAINTY SCALE (LIKELIHOOD)</th>
<th>SEVERITY/BENEFICIAL SCALE</th>
<th>SIGNIFICANCE PRE-MITIGATION</th>
<th>MITIGATION MEASURES</th>
<th>SIGNIFICANCE POST-MITIGATION</th>
</tr>
</thead>
</table>
| Disturbance of sensitive Mthatha Moist Grassland due to construction activities. | Localised | Short-term | Probable | Moderately severe | MODERATE | • Construction activities must be limited to the designated footprint of the road upgrade route i.e. construction materials, vehicular storage, construction camps etc., should occur in a footprint which will ultimately be developed as part of the facility.  
• There should be minimal disturbance to Mthatha Moist Grassland areas as successful vegetation recovery will depend on the remaining vegetation.  
• Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and re-vegetation must be undertaken. | |
| High volumes of *Aloe ferox* species are found on either side of the Mbashe River as well as on the quarry 2 site. Upgrade of the N2 road section and mining of quarry 2 will result in the permanent loss of these species. | Localised | Medium-term | Definite | Severe | HIGH | • All aloes impacted by construction and mining activities must be conserved and rescued.  
• All rescued aloes can be kept in a temporary onsite nursery for the duration of construction.  
• All rescued aloes must be replanted within the site where it was originally found or in close proximity during rehabilitation. | MODERATE |
## Table 7.4. Assessment and mitigation of impacts identified in the Operational Phase for all alternatives.

<table>
<thead>
<tr>
<th>DESCRIPTION OF IMPACTS</th>
<th>SPATIAL SCALE</th>
<th>TEMPORAL SCALE (DURATION)</th>
<th>CERTAINTY SCALE/ LIKELIHOOD</th>
<th>SEVERITY/ BENEFICIAL SCALE</th>
<th>SIGNIFICANCE PRE-MITIGATION</th>
<th>MITIGATION MEASURES</th>
<th>SIGNIFICANCE POST-MITIGATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Issue: Invasion of alien species</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowing invading species to expand will lead to a large scale alien invasion.</td>
<td>Project level</td>
<td>Long-term</td>
<td>Probable</td>
<td>Moderately severe</td>
<td>MODERATE</td>
<td>• An alien removal plan must be implemented and run during operational phase.</td>
<td>LOW</td>
</tr>
<tr>
<td><strong>Issue: Toxicants spilling from vehicles</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Toxicants (such as heavy metals, hydrocarbons, surfactants and oils) spilled from vehicles may negatively impact the surrounding environment and biodiversity. | Localised | Long-term | Probable | Severe | MODERATE | • Service roads should not exceed 4 metres in width and should incorporate storm water levees to reduce the likelihood of erosion.  
• Develop and implement an Erosion Action Plan.  
• Construction sites must be more that 100m from any water body. | LOW |
8 IMPACT STATEMENT, CONCLUSION & RECOMMENDATIONS

8.1 Conclusions

The following table summarises the change in impacts from pre- to post- mitigation for the proposed Rehabilitation of the N2 from Tetyana to Sitebe Komkulu road section.

Table 8.1. Assessment of pre- and post-mitigation impact significance.

<table>
<thead>
<tr>
<th>STAGES</th>
<th>PRE-MITIGATION</th>
<th></th>
<th>POST-MITIGATION</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOW</td>
<td>MODERATE</td>
<td>HIGH</td>
<td>LOW</td>
</tr>
<tr>
<td>Planning and Design</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Construction</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Operation</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>0</td>
<td>7</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

The following ecological impacts are considered as HIGH impacts associated with the upgrade of the N2 road section between Tetyana and Sitebe Komkulu (Table 8.2).

Table 8.2. Impacts considered as HIGH pre-mitigation.

| Planning & Design Phase | Impact                                                                 | Mitigation                                                                 | Reduced to MODERATE                                                                 | Impact                                                                 | Mitigation                                                                 | Reduced to LOW                                                                 | Impact                                                                 |
|-------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|                         | Inappropriate road stormwater design may lead to an increase in surface soil erosion and subsequently sedimentation of the surrounding rivers and streams. | Ensure that appropriate stormwater structures are designed and implemented. Ensure that all road sections situated on slopes incorporate storm water diversion Ensure that all stormwater structures are designed in line with both SANRAL and DWS requirements. If any construction footprint takes place inside or within 50 meters of any river, stream or drainage system, authorisation from DWS must be obtained. If any construction footprint takes place inside or within 500 meters of any wetland, authorisation from DWA must be obtained. Develop and implement an Erosion Action Plan. | Erosion and degradation of water-courses and associated habitats due to poor planning and design (i.e. inappropriate utilisation of sensitive aquatic systems). | Ensure that a buffer zone of 32 metres from all perennial and non-perennial rivers and streams are maintained. No development activities may occur within this area. If any construction footprint takes place inside or within 32 meters of any water body, authorisation from DWA must be obtained. | Upgrade of the N2 road section will result in the permanent loss of various plant SSC identified. | Mitigation: |
The road upgrade route must be surveyed prior to topsoil removal in order to locate SSC and transplant them into the neighbouring undeveloped environment.

A Plant Rescue & Protection Plan must be implemented and managed by a vegetation specialist familiar with the site in consultation with the appointed ECO.

Reduced to LOW

Construction Phase

Impact: Upgrading the sections of N2 road as well as the bridges across these rivers may cause increase levels of sedimentation and pollution into them during both construction and operation.

Mitigation:
- Ensure that a buffer zone of 32 metres from both the Candu & Mbashe Rivers is maintained. No development activities may occur within this area.
- If any construction footprint takes place inside or within 32 meters of both the Candu & Mbashe Rivers, authorisation from DWS must be obtained.

Reduced to LOW

Impact: High volumes of Aloe ferox species are found on either side of the Mbashe River as well as on the quarry 2 site. Upgrade of the N2 road section and mining of quarry 2 will result in the permanent loss of these species.

Mitigation:
- All aloes impacted by construction and mining activities must be conserved and rescued.
- All rescued aloes can be kept in a temporary onsite nursery for the duration of construction.
- All rescued aloes must be replanted within the site where it was originally found or in close proximity during rehabilitation.

Reduced to MODERATE

8.2 Recommendations for the proposed upgrade of the N2 road section between Tetyana and Sitebe Komkulu.

All the mitigation measures provided below are to be implemented in the Planning and Design, Construction and Operation Phases of the proposed upgrade of the N2 road section between Tetyana and Sitebe Komkulu.

8.2.1 Planning and design phase

- An Environmental Control Officer (ECO) must be appointed to oversee construction activities.
- Construction activities must be limited in areas where pristine and semi-pristine Bisho Thornveld and Eastern Cape Bushveld are found.
- Ensure that appropriate stormwater structures are designed and implemented.
- Ensure that all road sections situated on slopes incorporate storm water diversion.
- Ensure that all stormwater structures are designed in line with both SANRAL and DWS requirements.
- If any construction takes place inside or within 50 meters of any river, stream or drainage system, authorisation from DWS must be obtained.
- If any construction takes place inside or within 500 meters of any wetland, authorisation from DWA must be obtained.
- Develop and implement an Erosion Action Plan.
- Ensure that a buffer zone of 32 metres from all perennial and non-perennial rivers and streams are maintained. No development activities may occur within this area.
- If any construction takes place inside or within 32 meters of any water body, authorisation from DWA must be obtained.
- The road upgrade route must be surveyed prior to topsoil removal in order to locate SSC and transplant them into the neighbouring undeveloped environment.
A Plant Rescue & Protection Plan must be implemented and managed by a vegetation specialist familiar with the site in consultation with the appointed ECO.

8.2.2 Construction phase

- Ensure that a buffer zone of 32 metres from both the Candu & Mbashe Rivers is maintained. No development activities may occur within this area.
- If any construction footprint takes place inside or within 32 meters of both the Candu & Mbashe Rivers, authorisation from DWS must be obtained.
- The development area must be surveyed prior to topsoil removal in order to locate and capture any SSC and relocate them.
- A Rehabilitation Management Plan must be implemented.
- An Alien Removal Plan must be implemented and run during the construction phase.
- Construction activities must be limited to the designated footprint of the road upgrade route i.e. construction materials, vehicular storage, construction camps etc., should occur in a footprint which will ultimately be developed as part of the facility.
- There should be minimal disturbance to Mthatha Moist Grassland areas as successful vegetation recovery will depend on the remaining vegetation.
- Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and re-vegetation must be undertaken.
- All aloes impacted by construction and mining activities must be conserved and rescued.
- All rescued aloes can be kept in a temporary onsite nursery for the duration of construction.
- All rescued aloes must be replanted within the site where it was originally found or in close proximity during rehabilitation.

8.2.3 Operational phase

- An alien removal plan must be implemented and run during operational phase.
- Service roads should not exceed 4 metres in width and should incorporate storm water levees to reduce the likelihood of erosion.
- Develop and implement an Erosion Action Plan.
- Construction sites must be more than 100m from any water body.

8.3 Proposed management plans to be developed and implemented as part of the final EMPr

In summary, the following plans need to be developed as part of the final EMPr and Project monitoring, incorporating all the issues, conclusions and recommendations of this report:

- Stormwater Management Plan
- Erosion Action Plan
- Plant Rescue & Protection Plan
- Rehabilitation Management Plan
- Alien Vegetation Removal Plan (for both construction and operational phase)

8.4 Environmental Statement and Opinion of the Specialist

The ecological impacts of all aspects of the proposed upgrade of the N2 road section between Tetyana and Sitebe Komkulu were assessed and considered to be ecologically acceptable, provided that the mitigation measures provided in this report are implemented. The majority of the impacts are rated as MODERATE to HIGH pre-mitigation (Table 8.1), therefore implementation of recommended mitigation measures coupled with comprehensive rehabilitation and monitoring in terms of re-vegetation and restoration is an important element of the mitigation strategy. Implementing the recommended mitigations measures will reduce impacts to LOW to MODARATE.
Both proposed N2 road alternatives are deemed as acceptable provided that the recommended mitigation measures are implemented.

Both mining sites are considered as low sensitivity areas. Various SSC (Aloe ferox) were identified on low ridgelines within quarry site 2 and will require mitigation to conserve.
9 REFERENCES


Minerals and Petroleum Resources Development Act (No. 93 of 1996)


National Environmental Management: Biodiversity Act (No. 10 of 2004).

National Heritage Resources Act (No. 25 of 1999).

National Road Traffic Act (No. 93 of 1996)

